APPENDIX E

WEATHER EFFECTS ON AVIATION

Army aviation operates over the length and breadth of the battlefield. Missions are varied and include both fixed-wing and rotary-wing aircraft. Battlefield aviation assets play a role in a host of missions including mobility, countermobility, survivability, C^2, fire support, maneuver, air defense, IEW, combat service, and combat service support. Weather support is critical and impacts both planning and execution.

Aviation planners must include weather conditions in takeoff areas, employment routes, engagement zones, PZs, and LZs to list just a few. Aviation commanders must consider all weather conditions both favorable and unfavorable. Accurate forecasts in the AO and AI are more critical to air operations than most land operations. This is especially true for the deep battle missions.

Listed below are weather effects for aviation that are not contained in the WTDA tables.

CLOUDS AND SKY COVER. Clouds are always a major consideration for aviation operations. Low overcast clouds will limit the effectiveness of aerial illumination devices. Overcasts tend to limit heating of inactive targets and lower target detection range for thermal sights. NVD are limited by clouds blocking natural illumination from the moon or the stars. CAS and aerial resupply missions are degraded by low clouds.

DENSITY ALTITUDE. This is a critical measurement that determines if an aircraft has enough lift capabilities and performance to get off the ground. Too much density altitude limits fuel, weapons, and passenger loads.

DEWPOINT. The dewpoint (see the glossary for an explanation) serves as a warning of possible fog formation or icing conditions. It is a key measurement in computing density altitude (see above).

ICING. Ice on lifting surfaces affects the aerodynamics of the aircraft. Even a little ice is a big problem.

ILLUMINATION. NVD are most efficient with about a quarter (23 percent) of the moon, 30 degrees above the horizon, scattered clouds, and the sun more than 5 degrees below the horizon. Detailed products dealing with the use of E-O devices are available from the SWO.

INFRARED CROSSOVER. This is a temperature condition that affects target acquisition. Your SWO will tell you when this is expected to occur.

PRECIPITATION. Rain and snow affect visibility and the safety of both crew and airframe. In some instances, precipitation may cause predetonation of munitions.

PRESSURE ALTITUDE. This computed figure affects all aircraft engine performance.

SNOW DEPTH. Snow compounds ground handling problems. Light, powdery snow may interfere with helicopter hover operations.

STATE-OF-THE-GROUND. Ground conditions impact on the effectiveness of serially delivered munitions.

SURFACE WINDS. Strong winds, especially cross-winds, affect aircraft control near the ground during take-off and landings. They also affect ground speed for low-level frights.

TEMPERATURE. High temperatures reduce lift capability. Cold temperatures increase maintenance requirements and the time needed to accomplish each task. The number of personnel that can be carried on a flight is reduced due to the weight of cold-weather gear.

THUNDERSTORMS AND LIGHTNING. Extreme weather that includes thunderstorms and lightning is very hazardous to inflight operations, refueling, and rearming operations.

TURBULENCE. Severe weather and clear air turbulence is a critical condition affecting all aviation assets and missions. It may cause aircraft structural damage or even crashes during take-offs and landings. Severe turbulence may cancel all operations.

VISIBILITY. The lack of good visibility affects landings and take-offs, visual reconnaissance, target acquisition, E-O target designation, terminally guided munitions, and the ability to distribute scatterable mines.

WINDS ALOFT. Winds at flight altitudes always affects navigation and fuel consumption.

Table E-1. Weather effects from cloud ceilings.

WEATHER VALUE (FEET)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
LT 300	NOE Day target acquisition, flat terrain		Day, flat terrain	AR 95-1
LT 500	Night target acquisition, flat terrain Day target acquisition, mountain terrain		NOE day, mountain terrain Night, flat terrain	AR 95-1 AR 95-1
LT 1,000	Night target acquisition mountain terrain Military free-fall HAHO	Minimum base of cloud over DZ	Army aviation, aerial observations CAS	
LT 1,100	HELLFIRE	Low angle approach		
LT 2,600	HELLFIRE	High angle approach		

Table E-2. Weather effects from reduced visibility.

WEATHER VALUE (METERS)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
LT 200	NVG (PVS-5)		LAW Infrared aiming light (PAQ-4)	
LT 400	NOE operations NVS (PVS-2)			
LT 600	NVS (PVS-4)			
LT 800	Target acquisition		Helicopter, day, flat or mountain NOE	AR 95-1
LT 1,000	TOW		DRAGON DRAGON thermal sight (TAS-5) M-60 machine gun	
LT 1,200	NVS (TVS-2, TVS-5)			
LT 1,600	KIOWA (OH-58)	Target acquisition	Helicopter, night, flat or mountain .50-cal machine gun	AR 95-1
LT 2,000			Aerial target acquisition Night vision sight (TVS-4)	
LT 2,500	Military free-fall HAHO	Minimum altitude for RAP		
LT 3,200			TOW TOW thermal sight (UAS-12) Handheld thermal viewer (PAS-7) Thermal night observation device (UAS-11) Fixed wing, night, flat terrain operations, target acquisition	AR 95-1
LT 3,800			7.62-mm coaxial aerial machine gun	

Table E-3. Weather effects from surface wind.

WEATHER VALUE (METERS)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
GT 15			Acoustic sensors	Less effective
GT 15 Cross-wind component	MOHAWK (OV/RV-1D)	Grounded, max for takeoff or landing	TOW	Impacts tracking
GT 15 Gust spread	Two-bladed helicopter			
GT 20			Communications antennas NOE operations Forward area refueling point Two-bladed helicopter	
GT 25			COBRA (AH-1) rocket launcher Personnel	2.75 inch rockets degraded
GT 25 Cross-wind component	UTE (U-21) HURON (C-12)	Grounded, max for takeoff or landing		
GT 30	Two-bladed helicopter COBRA (AH-1) CHINOOK (CH-47) IROQUOIS (UH-1)		Four-bladed helicopter	
GT 40	COBRA (AH-1S) CAYUSE (OH-6) SEMINOLE (U-8) Personnel			
GT 45	Acoustic sensors Four-bladed helicopter KIOWA (OH-58) BLACKHAWK (UH-60) APACHE (AH-64)	Less effective		
GT 50	Communications antennas SKY CRANE (CH-54)			
GT 60	MOHAWK (OV/RV-1D) HURON (C-12) UTE (U-21)			

Table E-4. Weather effects from temperature.

WEATHER VALUE (°F/°C)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
LT -29/-34	BLACKHAWK (UH-60)	Ice fog will limit/halt visual flight	BLACKHAWK (UH-60)	wo special service
LT -25/-32	TOW Dry cell battery Personnel	 Only 20% effective	Generators	wo arctic kit
LT -20/-28			NVS (PVS-4 and TVS-5) Maintenance	wo low adapter Takes five times longer
LT 0/-18			Wheeled vehicles Dry cell battery	wo winter kit Only 40% effective
LT 32/0			NVG (PVS-5) Personnel	wo arctic kit See app L windchill
GT 85/29			Personnel	See app L temp, humidity index
GT 90/32	MOHAWK (OV/RV-1D), IROQUOIS (UH-1)	Above 4,000 ft	UTE (U-21), MOHAWK (OV/RV-1D), HURON (C-12), IROQUOIS (UH-1), BLACKHAWK (UH-60)	Lift
GT 95/35	Personnel	See app L for water consumption	Dry cell battery COBRA (AH-1)	Will not hold charge Lift/flight time
GT 119/49	HURON (C-12)	At sea level		
GT 125/52	All NVS Generators			

Table E-5. Weather effects from precipitation.

WEATHER CONDITION	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
Light rain or snow			Wheeled vehicles	
Moderate rain or snow	Wheeled vehicles		LOS communications Personnel movement Target acquisition Equipment storage Laser systems	
Heavy rain or snow	Artillery detection radar (TPQ-36) Personnel movement LOS communications Target acquisition Laser systems		Rocket firing SLAR Radar systems	Predetonate
Thunder-storm/ lightning	MOHAWK (OV/RV-1D)	Imbedded thunder-storms	Ammunition Aircraft Refueling Communications Equipment storage SLAR	AR 95-1 Safety Interference
Light freezing rain	Aircraft (wo deice)	AR 95-1	Personnel Wheeled vehicles	
Moderate freezing rain, ice	Personnel Wheeled vehicles	AR 95-1	Rocket firing Aircraft (with deice)	Predetonate AR 95-1
Heavy freezing rain, ice	Aircraft (with deice)	AR 95-1		
SNOW DEPTH (INCHES)				
GT 3			Personnel movement All fixed-wing aircraft	
GT 6	Personnel movement All fixed-wing aircraft	Propeller clearance, braking	20-mm and 40-mm ammunition Wheeled vehicles	
GT 12	Wheeled vehicles			
GT 20			Tracked vehicles	
GT 30	Tracked vehicles			